

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 39

UNITED STATES PATENT AND TRADEMARK OFFICE

**MAILED**

**MAR 27 2002**

BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

**PAT. & T.M. OFFICE  
BOARD OF PATENT APPEALS  
AND INTERFERENCES**

*Ex parte AKIO TANAKA, NAOTO MIWA, TOSHITAKA SAITO,  
HIROMI SANO, KAZUNORI SUZUKI and MASAYA FUJIMOTO*

Appeal No. 2000-1075  
Application 08/838,910

HEARD: MARCH 5, 2002

Before OWENS, LIEBERMAN and JEFFREY SMITH, *Administrative Patent Judges*.

OWENS, *Administrative Patent Judge*.

*DECISION ON APPEAL*

This appeal is from the final rejection of claims 32-37 and refusal to allow claims 21-26 as amended after final rejection. Claims 12-15 and 27-31, which are all of the other claims pending in the application, have been indicated allowable.

*THE INVENTION*

The appellants' claimed invention is directed toward an oxygen detector having a built-in heater. Claims 21 and 32 are

illustrative:

21. An oxygen concentration detector comprising:

a sensor element including a solid electrolyte and external and internal electrodes provided on external and internal surfaces thereof, respectively;

a high-emissivity layer provided on a surface of said internal electrode; and

a heater disposed adjacent to said high-emissivity layer to form a clearance therebetween, the clearance being 0.1 mm or more, wherein:

said internal electrode has an emissivity less than that of said high-emissivity layer; and

said high-emissivity layer has an emissivity of 0.3 or more, and a porosity more than 10 percent.

32. An oxygen concentration detector comprising:

a sensor element including a solid electrolyte and external and internal electrodes provided on external and internal surfaces thereof, respectively; and

a heater disposed adjacent to said internal electrode to form a clearance therebetween, the clearance being 0.1 mm or more;

wherein said heater has an emissivity of 0.6 or more.

THE REFERENCES

Pollner et al. (Pollner)	4,021,326	May 3, 1977
Torisu et al. (Torisu)	4,452,687	Jun. 5, 1984
Sakurai et al. (Sakurai)	4,540,479	Sep. 10, 1985
Ker et al. (Ker)	4,900,412	Feb. 13, 1990
Agarwal et al. (Agarwal)	4,935,118	Jun. 19, 1990

*THE REJECTIONS*

The claims stand rejected under 35 U.S.C. § 103 as follows: claims 21-26 and 36 over Torisu in view of Sakurai and Pollner,<sup>1</sup> and claims 32-35 and 37 over Ker in view of Agarwal.<sup>2</sup>

*OPINION*

We reverse the aforementioned rejections. We need to address only the independent claims, i.e., claims 21, 32 and 36.

*Rejection of claims 21 and 36*

The appellants' claims 21 and 36 both require a high emissivity layer having a porosity of more than 10% on a surface of an internal electrode.

Torisu discloses an oxygen concentration sensor having on inner and outer electrodes "protective layers made of alumina and spinel and adapted to protect the electrodes and to limit the flow of oxygen through the cathode" (col. 3, lines 5-8). Torisu does not disclose the porosity of the protective layers. To

---

<sup>1</sup> In this rejection the examiner no longer relies upon Ker and U.S. 4,212,720 to Maurer (answer, page 3).

<sup>2</sup> A rejection of claims 21-26 and 31 under 35 U.S.C. § 112, first paragraph, is withdrawn in the examiner's answer (page 2).

remedy this deficiency the examiner relies upon Pollner.<sup>3</sup>

Pollner discloses an oxygen concentration detector having on an external electron conductive layer (13) a porous cover coating (14) which preferably is made of an oxide or a mixed oxide such as spinel and may have a pore area between 10% and 50% (col. 4, lines 4-6; col. 5, lines 19-32).

The examiner argues that Torisu's protective layer must be sufficiently porous to permit passage of reference air, and that a protective layer having a porosity of 10% obviously would provide both the required protection and porosity (answer, pages 5 and 8). The references are totally analogous, the examiner argues, and "[i]ncorporating conventional features from analogous prior art is within the skill of the art" (answer, page 5).

In order for a *prima facie* case of obviousness to be established, the teachings from the prior art itself must appear to have suggested the claimed subject matter to one of ordinary skill in the art. See *In re Rinehart*, 531 F.2d 1048, 1051, 189 USPQ 143, 147 (CCPA 1976). The mere fact that the prior art

---

<sup>3</sup> Sakurai is relied upon by the examiner for a disclosure of a heater within a sensor element (answer, page 4), and not for a teaching which remedies the deficiency in Torisu as to the porosity of the protective layer.

could be modified as proposed by the examiner is not sufficient to establish a *prima facie* case of obviousness. See *In re Fritch*, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992). The examiner must explain why the prior art would have suggested to one of ordinary skill in the art the desirability of the modification. See *Fritch*, 972 F.2d at 1266, 23 USPQ2d at 1783-84.

The examiner has not provided the required explanation as to how the applied prior art itself would have fairly suggested, to one of ordinary skill in the art, making Torisu's protective layer such that it has the porosity of Pollner's porous coating. Torisu teaches that his protective layer is adapted to protect the electrodes and to limit the flow of oxygen through the cathode (col. 3, lines 7-8), whereas Pollner believes that his porous coating mixes exhaust gas, the oxygen content of which is being measured, and causes the gas molecules to diffuse along the catalytically active electron conductive layer (col. 4, line 55 - col. 5, line 4). The references, therefore, indicate that the function of Pollner's porous coating differs from that of Torisu's protective layer. The examiner has not explained why, regardless of these differences, one of ordinary skill in the art would have been led by the references themselves to provide

Torisu's protective layer with the porosity of Pollner's porous coating. It is not sufficient for the examiner to merely assert that doing so is within the skill of the art.

Accordingly, we conclude that the examiner has not carried the burden of establishing a *prima facie* case of obviousness of the oxygen concentration detectors recited in the appellants' claims 21 and 36. Hence, we reverse the rejection of these claims and claims 22-26 which depend from claim 21.

*Rejection of claim 32*

Ker discloses an oxygen concentration detector including a sensor element comprising a solid electrolyte (14) having external and internal electrodes (26,22) on external and internal surfaces (28,24) thereof, respectively, and a heater element (62) disposed adjacent to the internal electrode to form a clearance therebetween (figure 1).<sup>4</sup> Ker discloses that the base material of the heater element is a ceramic such as alumina (col. 5, lines 41-43). The appellants' specification (page 12, table 1) indicates that alumina has an emissivity of 0.3. Ker does not disclose a heater element having an emissivity of 0.6 or more.

---

<sup>4</sup> The appellants do not challenge the examiner's argument (answer, page 6) that a clearance of at least 0.1 mm would have been fairly suggested to one of ordinary skill in the art by the applied prior art.

Agarwal discloses an oxygen sensor having a heating element (11,12) arranged to surround and radiate heat to a solid electrolyte tube (13) (abstract; col. 2, lines 22-24). The disclosed heating element materials include silicon carbide, silicon nitride and aluminum nitride (abstract; col. 4, lines 10-19). The fact that silicon carbide, silicon nitride and aluminum nitride are the heater materials recited in the appellants' claim 34, which depends from claim 32, indicates that they have an emissivity of at least 0.6.

The examiner argues that it would have been obvious to one of ordinary skill in the art to use Agarwal's silicon carbide, silicon nitride or aluminum nitride as Ker's heater material because these materials are readily available and inexpensive, Ker and Agarwal are analogous art, and incorporation of conventional features from analogous prior art is within the skill of the art (answer, pages 6 and 9).

The examiner has provided no evidence or reasoning which shows that one of ordinary skill in the art would have considered any readily available and inexpensive ceramic material to be suitable for use as Ker's heating element base material. Also, the examiner has not provided evidence or reasoning which shows that the references themselves would have led one of ordinary

skill in the art to combine their teachings as proposed by the examiner. Merely asserting that the references are analogous art and that using Agarwal's heating element materials as Ker's heater element base material is within the skill of the art is not sufficient for establishing a *prima facie* case of obviousness. The examiner must provide evidence or reasoning which shows that the references themselves would have led one of ordinary skill in the art to combine their teachings so as to arrive at the claimed invention, see *Rinehart*, 531 F.2d at 1051, 189 USPQ at 147, and the examiner has not done so. Consequently, we reverse the rejection of claim 36.

Appeal No. 2000-1075  
Application 08/838,910

*DECISION*

The rejections under 35 U.S.C. § 103 of claims 21-26 and 36 over Torisu in view of Sakurai and Pollner, and claims 32-35 and 37 over Ker in view of Agarwal, are reversed.

*REVERSED*

*Terry J. Owens*  
TERRY J. OWENS )  
Administrative Patent Judge )  
 )  
 )  
 )  
*Paul Leiberman*  
PAUL LIEBERMAN ) BOARD OF PATENT  
Administrative Patent Judge )  
 )  
 )  
*Jeffrey T. Smith*  
JEFFREY T. SMITH ) APPEALS AND  
Administrative Patent Judge )  
 )  
 )  
 ) INTERFERENCES  
 )  
 )

Appeal No. 2000-1075  
Application 08/838, 910

MICHELLE N. LESTER, ESQ.  
NIXON & VANDERHYE, P.C.  
1100 NORTH GLEBE ROAD, 8TH FLR.  
ARLINGTON, VA 22201-4714

TJO:caw